

REMARKS

Applicants have carefully reviewed this Application in light of the Office Action mailed July 6, 2004. Claims 1-6, 15 and 25 were previously canceled without prejudice or disclaimer. Claim 8 has been cancelled without prejudice or disclaimer and Claims 7, 9-14, 16-24 and 26-30 are now pending in this Application. Claims 7-14, 16-24, and 26-30 stand rejected under 35 U.S.C. §112, first paragraph and 35 U.S.C. §103. Applicants have amended Claims 7, 9, 12, 17-19, 21, 26 and 29 to further define various features of Applicants' invention. Applicants respectfully request reconsideration and favorable action in this case.

Rejections under 35 U.S.C. § 112

First, the Examiner rejected Claims 7-14, 16-24, and 26-30 under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventors, at the time the application was filed, had possession of the claimed invention. (Office Action, Section 6). In particular, the Examiner asserted that Applicants added new matter not supported by the original disclosure by amending Claims 7, 17 and 26 to recite "spatial information of the opening in the photomask operable to increase resolution of the image." (Office Action, Section 4).

Although Applicants believe that the language in question is in fact supported by the original disclosure, Claim 7 has been amended to recite:

"... the thin film formed to cooperate with a photomask including an opening to facilitate projection of an image from the photomask onto a surface, the resolution of the projected image defined at least in part by spatial information contained within light diffracted by the opening."

Such limitations are fully supported by the original disclosure. For example, the Specification recites:

Important technical advantages of certain embodiments of the present invention include increasing the ability of a photolithography system to resolve fine features of an image. Conventional pellicles typically are optimized to transmit normal incidence light at a desired exposure wavelength for a

photolithography system. Conventional pellicles may also be optimized to attenuate light diffracted by the transparent openings of a photomask and may prevent the imaging lens from capturing spatial information contained in the diffracted light. A pellicle may be formed in accordance with the teachings of the present invention to optimize off-axis transmission, and therefore, increase the amount of spatial information or fine features of reduced geometry sizes captured by the associated photolithography system. (Specification, Page 7, lines 8-22).

As another example, the Specification recites:

. . . Furthermore, if a transmission maxima for larger angles of incidence occurs at the exposure wavelength of the photolithography system, the system may capture the spatial information contained in the higher order peaks and create a high resolution image of the openings on the photomask. (Specification, Page 15, lines 6-11).

Thus, the limitations recited above are clearly supported by the original disclosure.

Second, the Examiner rejected Claims 7-14, 16-24, and 26-30 under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to make and/or use the invention. (Office Action, Section 7). In particular, with respect to Claims 7 and 26, the Examiner asserted that it is "not clear how can one deduce the maximum transmission for a *non-normal incidence*, as recited in claims 7 and 26." Claims 7 and 26 have been amended to recite: "the optical thickness being greater than a design thickness by an amount less than or equal to approximately one-quarter of the exposure wavelength such that transmission of light at the exposure wavelength at an angle of incidence greater than zero is substantially maximized, the design thickness comprising a thickness of the thin film that maximizes transmission of light incident to the thin film at a normal angle at the exposure wavelength." Thus, the thickness of the thin film which provides the substantially maximum transmission of non-normal light is specified in the claims. Therefore, Applicants respectfully submit that the Examiner's rejection of Claims 7 and 26 is now moot in light of the current amendments to such claims.

In addition, apparently with respect to Claims 9, 12, 19, 21 and 29, the Examiner asserted that the limitation "further comprising a peak in transmission for normal incidence location between approximately one nanometer and approximately twenty nanometer above

the exposure wavelength” is not enabled by the disclosure. (Office Action, Section 7).
Claims 9, 12, 19, 21 and 29 have been amended to recite:

The pellicle of Claim [], further comprising the thin film having an associated peak in transmission for normal incidence light at a wavelength between approximately one nanometer and approximately twenty nanometers above the exposure wavelength.

Applicants respectfully submit that such limitation is enabled by the disclosure and therefore, the Examiner’s rejection of Claims 9, 12, 19, 21 and 29 is now moot in light of the current amendments to such claims.

Rejections under 35 U.S.C. § 103

Claims 7-14, 16-24, and 26-30 stand rejected by the Examiner under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,742,386 issued to Noriyuki Nose et al. (“Nose”) in view of U.S. Patent No. 4,657,805 issued to Yasunori Fukumitsu et al. (“Fukumitsu”). Applicants respectfully traverse for at least the following reasons.

A. Claims 7-14 are Allowable over the proposed *Nose-Fukumitsu* combination.

Independent Claim 7, as amended, recites:

A pellicle operable for use with light at an exposure wavelength, the pellicle comprising:

a frame; and

an amorphous fluoropolymer thin film including an optical thickness coupled to the frame, the optical thickness being greater than a design thickness by an amount less than or equal to approximately one-quarter of the exposure wavelength such that transmission of light at the exposure wavelength at an angle of incidence greater than zero is substantially maximized, the design thickness comprising a thickness of the thin film that maximizes transmission of light incident to the thin film at a normal angle at the exposure wavelength;

the thin film formed to cooperate with a photomask including an opening to facilitate projection of an image from the photomask onto a surface, the resolution of the projected image defined at least in part by spatial information contained within light diffracted by the opening.

The proposed *Nose-Fukumitsu* combination fails to disclose, teach or suggest this combination of limitations. For example, the proposed *Nose-Fukumitsu* combination fails to disclose, teach or suggest a pellicle film having an “optical thickness being greater than a design thickness by an amount less than or equal to approximately one-quarter of the exposure wavelength such that transmission of light at the exposure wavelength at an angle of incidence greater than zero is substantially maximized, the design thickness comprising a thickness of the thin film that maximizes transmission of light incident to the thin film at a normal angle at the exposure wavelength,” as specifically recited in amended Claim 7.

Nose discloses an apparatus for detecting foreign matter on a substrate by projecting light onto a pellicle and a pattern surface at an angle and measuring scattered light and the reflectivity or transmittance of the pellicle. (Col. 2, lines 47-64). Nowhere does *Nose* disclose, teach or suggest a pellicle film having an optical thickness greater than a design thickness – e.g., a thickness at which transmission of normal incident light at a particular wavelength is maximized – by a particular amount such that transmission of light at the particular wavelength at an angle of incidence greater than zero is substantially maximized. In fact, *Nose* fails to disclose, teach or suggest anything regarding an “optical thickness” of a film at all, which is defined in Applicants’ specification as “optical thickness = $n \times d$ ” where n is the refractive index of the film and d is the physical thickness of the film. (Specification, page 14, lines 1-5). Moreover, *Nose* fails to disclose, teach or suggest anything regarding transmission of light through a film at a normal angle, much less a pellicle film having an optical thickness based on a design thickness at which transmission of normal incident light at a particular wavelength is maximized.

Fukumitsu also fails to disclose, teach or suggest these limitations. Nowhere does *Fukumitsu* disclose, teach or suggest a pellicle film having an optical thickness greater than a design thickness – e.g., a thickness at which transmission of normal incident light at a particular wavelength is maximized – by a particular amount such that transmission of light at the particular wavelength at an angle of incidence greater than zero is substantially maximized. In fact, *Fukumitsu* does not even mention transmission of light incident to a pellicle at an angle of incidence greater than zero (i.e., non-normal incidence).

For at least these reasons, the proposed *Nose-Fukumitsu* combination fails to disclose, teach, or suggest all of the limitations recited in amended Claim 7. Therefore, Applicants respectfully request reconsideration and allowance of amended Claim 7, together with Claims 9-14 that depend therefrom.

B. Claims 17-24 are Allowable over the proposed *Nose-Fukumitsu* combination.

Independent Claim 17, as amended, recites:

A photolithography system for optimizing off-axis transmission of light, comprising:
a photomask including an opening; and
a pellicle comprising:
a frame coupled to the photomask; and
an amorphous fluoropolymer thin film operable to transmit approximately ninety-nine percent (99%) of off-axis light at an exposure wavelength such that an image of the opening projected onto a surface by the photomask includes spatial information contained in the off-axis light, the resolution of the projected image defined at least in part by spatial information contained within a portion of the off-axis light diffracted by the opening.

The proposed *Nose-Fukumitsu* combination fails to disclose, teach or suggest this combination of limitations. For example, the proposed *Nose-Fukumitsu* combination fails to disclose, teach or suggest, “an image of the [photomask] opening projected onto a surface by the photomask includes spatial information contained in the off-axis light, the resolution of the projected image defined at least in part by spatial information contained within a portion of the off-axis light diffracted by the opening,” as specifically recited in amended Claim 17. Neither *Nose* nor *Fukumitsu* discloses, teaches or suggests anything that could be equated with “spatial information contained in . . . off-axis light,” much less “spatial information contained within a portion of the off-axis light diffracted by [a photomask] opening,” much less “the resolution of [a] projected image defined at least in part by [such] spatial information.”

For at least these reasons, the proposed *Nose-Fukumitsu* combination fails to disclose, teach, or suggest all of the limitations recited in amended Claim 17. Therefore, Applicants

respectfully request reconsideration and allowance of amended Claim 17, together with Claims 18-24 that depend therefrom.

C. Claims 26-30 are Allowable over the proposed *Nose-Fukumitsu* combination.

Independent Claim 26, as amended, recites:

A method for performing photolithography, comprising:
forming an amorphous fluoropolymer thin film including an optical thickness, the optical thickness being greater than a design thickness by an amount less than or equal to approximately one-quarter of an exposure wavelength such that transmission of light at the exposure wavelength at an angle of incidence greater than zero is substantially maximized, the design thickness comprising a thickness of the thin film that maximizes transmission of light incident to the thin film at a normal angle at the exposure wavelength;
attaching the thin film to a frame to form a pellicle;
mounting the pellicle on a photomask including an opening;
exposing the pellicle and the photomask to radiant energy having the exposure wavelength, the radiant energy being incident upon the pellicle at the angle of incidence greater than zero; and
projecting the radiant energy through the opening in the photomask to form an image on a surface, the thin film operable to facilitate projection of spatial information associated with the opening, the resolution of the image projected on the surface being defined at least in part by the projected spatial information.

The proposed *Nose-Fukumitsu* combination fails to disclose, teach or suggest this combination of limitations. For example, the proposed *Nose-Fukumitsu* combination fails to disclose, teach or suggest “forming an amorphous fluoropolymer thin film including an optical thickness, the optical thickness being greater than a design thickness by an amount less than or equal to approximately one-quarter of an exposure wavelength such that transmission of light at the exposure wavelength at an angle of incidence greater than zero is substantially maximized, the design thickness comprising a thickness of the thin film that maximizes transmission of light incident to the thin film at a normal angle at the exposure wavelength,” for at least the reasons discussed above regarding Claim 7.

As another example, the proposed *Nose-Fukumitsu* combination fails to disclose, teach or suggest “projecting the radiant energy through the opening in the photomask to form an image on a surface, the thin film operable to facilitate projection of spatial information”

associated with the opening, the resolution of the image projected on the surface being defined at least in part by the projected spatial information,” for at least the reasons discussed above regarding Claim 17.

For at least these reasons, the proposed *Nose-Fukumitsu* combination fails to disclose, teach, or suggest all of the limitations recited in amended Claim 26. Therefore, Applicants respectfully request reconsideration and allowance of amended Claim 26, together with Claims 26-30 that depend therefrom.

CONCLUSION

Applicants appreciate the Examiner's careful review of the application. Applicants have now made an earnest effort to place this case in condition for allowance in light of the amendments and remarks set forth above. For the foregoing reasons, Applicants respectfully request reconsideration of the rejections and full allowance of Claims 7, 9-14, 16-24 and 26-30, as amended.

Applicants believe no fees are due at this time, however, the Commissioner is hereby authorized to charge any fees to Deposit Account No. 50-2148 of Baker Botts L.L.P. in order to effectuate this filing.

If there are any matters concerning this application that may be cleared up in a telephone conversation, please contact Applicants' attorney at 512.322.2581.

Respectfully submitted,

BAKER BOTTS L.L.P.
Attorneys for Applicants



Paula D. Heyman
Reg. No. 48,363

Date: Oct. 5, 2004

Correspondence Address:
Baker Botts L.L.P.
CUSTOMER NO. 31625
512.322.2581
512.322.8328 Fax